

## Technical Training Series- How to clean a seed collection

Hello, I'm Lucy and I'm one of the seed collections assistants here at the Millennium Seed Bank. Today we are in our cleaning lab and I'm going to talk to you about the cleaning that we do here. When we clean a seed collection, we are aiming to reduce the bulk as much as possible we would like to reduce the risk to the collection, and we would also like to produce a collection of viable plant propagules. We do this by removing as much bulk as possible so that means twigs, stems, leaves etc. if we can we'll try and extract the seeds from the fruit and, if possible, we'll also try and remove infested seeds, empty seeds, and any other bits of debris that we find.

So, when we start cleaning a seed collection, the first thing we need to do is to get the collection out and assess it. What state is it in? How much material is there? Is it fruits or seeds? And we definitely need to know what the seeds look like, which isn't always obvious. If there aren't many seeds available we know that we need to be really careful when we start cleaning the collection. It's good practice to take a small sample first and test your chosen method on it before you then apply it to the rest of the collection. The really really important thing is not to damage anything. We are a wild seed bank and we want to conserve all the seeds we find which also sometimes means keeping the wonky and odd ones as well, but the important thing is not to throw any good seed away. One of the most important methods of cleaning is sieving. And here we have sieves in a range of sizes and it is important to have lots of different sizes if you can. The large size at the top, ideally our seeds will fall through this and at the bottom we have the small size and ideally the seeds will catch on here and the small debris will fall through into the pan below. So let's give this a try. And as you can see, in the bottom of this pan we have the seeds and we have some small debris in the bottom. The problem we now have is that we have some capsules left in the top pan here and these contain seed, so another technique we can use is called rubbing, and this is a very useful technique for species that might also be damaged by the sieving they could be quite delicate and as we don't want to damage them we can use gloves and you can just grab a basic mat and very gently you crush them with your hands. We can then put this back through the sieves and we should be able to get more seeds out of it. Another technique you can use is with a rubber bung. And this can be used for collections that are quite robust. So, you can put some of your collection in the top sieve. And if they're quite tough you can use the bung to gently move them around and break them up. It is important to test a small sample first to make sure you're not damaging the seed. So sometimes when we get a new collection to clean they come in capsules. If we were to start using the sieves and the bungs or even gloved rubbing, we would create an awful lot of small debris that is quite hard to separate from the seeds. So, for things like Scrophulariaceae, Caryophyllaceae and Crassulaceae it's best to keep them in the capsules and just to shake the capsules. Very simply all you do is take a sample and shake them. If they're mature this will work because they will leave the capsules and afterwards have a look in to see if you can see any seeds left over. It's important that you check any remaining capsules to make sure you've got all the seeds out.

### Bag crushing

Sometimes when you're cleaning a collection it's actually better to keep it in the bag. This might be for example, if you've got a flat pod like a legume or something nasty and spikey like a *Cirsium*, you might want to keep it in the bag and do what we call a bag crush. Very simply, you start crushing it up and breaking up the flat pods or your capsules or whatever plant material you have got in there. It's also really good if you've got hairy collections which might be an irritant. The hairs will get trapped inside the bag, you can then open up your bag and tip your collection into a tray.

## Cleaning fleshy fruit

Sometimes when a collection arrives its actually in a wet fruit, for example this passion fruit. The problem is that mature seeds can decline quite quickly in mature fruit so we need to get them out as quickly as possible. The first thing we need to do is extract the seeds, so I'm going to open them up here. And we can see inside there are fleshy fruits which I'm going to scrape out. Now that we've scrapped the seeds out you can see they're really wet and there's a lot of mucilage on them, we need to remove this. So, what we're going to do is take it over to the sink and wash it off with warm water. So here we have our passion fruit seeds. So, I'm going to put them into a sieve here and I've chosen a sieve small enough that they won't fall through. Now when you wash seeds it's important to use warm but not hot water, we don't want to damage the seeds. And very carefully once they're a little bit wet move them around with your gloved hand and very gently the mucilage will come off. As you can see it's starting to come off now. And you will need to repeat this several times and it is important to try and do this as gently as possible. So, I'm going to put them onto this tray which has got some mesh netting on the top and this will allow them to drip dry gently. These will now dry at ambient conditions, so room temperature is fine. We will check them regularly to make sure they don't go mouldy. Once they're dry we can then process them further.

## Using an aspirator

Earlier you saw me sieve and bung it and also use a bit of glove rubbing to open up the last capsules, but we still have quite a lot of debris in with our seeds. One of the best bits of equipment you can use with this, is an aspirator. You put your seed collection in one of these. You put this in the bottom chamber, this here controls the air flow and it's the air flow that separates the seeds from the debris. Ideally, the seeds are heavier than the debris. We switch it on, and you can see the lighter debris is moving up this tube and collecting up here. And we can slowly increase the air flow to get more and more debris up into the top up here. If at any point I get a good seed up there I will stop as I want to keep all the good seeds in a collection.

## Quality testing

Once you're happy you've got to a reasonable end point, we then need to do a quality test. We need to work out how many potentially good seeds we have and whether we can indeed finish cleaning or whether we need to do further cleaning. When I'm assessing a collection, it's often best to be done under a microscope. For this you will need forceps and scalpels. We're looking for seeds that might be full, empty, infested or possibly immature. You also want to note down anything that might be of useful for the future, for example if the seeds look immature, or if the embryo is in an interesting position. Once you've done your quality test which is normally through a cut test make sure you record the data. It's extremely important information. It's also really important that you label your collection properly with a unique identifying number, otherwise you might get the collections mixed up and for some species you won't be able to tell the difference.

Just to recap when you start cleaning your seed collection, first make sure you know what the seeds look like and also check to make sure you're not going to damage the seeds with your chosen method. It's fine to try several different methods and some collections will need several different methods to clean them to an appropriate level. Once you're happy that you've done what you can do a quality test, that's normally a cut test where you look to see how many of the seeds are full or possibly immature or infested or empty. If the results of that test are poor you can then decide whether to try and clean again, if not and you're happy you've got to a reasonable end point make sure you've labelled your collection with its unique identifying number, record what you've done to it for future reference and how long it took you, then make sure you clean your work surface



properly and dispose of all the plant material in accordance with your local guidelines. Then you must take your collection and put it in either a dry room or your desiccator.

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